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SCIENTIFIC VERSUS PHOTOGRAPHIC EDUCATION.

WHATEVER may be the drawbacks possessed by our beautiful art of photography, great difficulty in learning its rudiments can hardly be called one of them.

Nevertheless, as we look back over now a long series of years devoted to the study and practice of photography, we can truthfully say that it has often been a matter of surprise to us to see the failures made by men of scientific attainments, and even of fine general education, in their early photographic attempts.

If we consider that a photograph is a picture made by the joint agency of light and chemicals, we can in some measure understand that a man who has, let us say, received a good training in chemistry, and who may in addition possess a smattering of a knowledge of optics, would deem himself ripe for the practice of photography, and start out in his work with the most sanguine expectations. Is he, however, quite justified in harboring these great expectations, and does the average of his work done in, say the first six or eight months, always satisfy himself and his friends? We do not ask whether the first three or four plates he exposes are fairly good, or even grand successes, as we have known happen; but we ask whether his previous training in matters outside of photography has always proved as useful as he might have supposed, and whether he has not had to learn the lesson that to make good photographs with ease and certainty requires something more than, and something differing from, the elegant exactitudes of scientific methods of study.

In looking back to those of our acquaintances who had studied the niceties of chemical manipulation in the laboratory, we may almost go so far as to say that in proportion to their skill and neatness as chemists, so were their photographic failures disastrous. Their dark-rooms, to be sure, were models of cleanliness and good order, and their solutions made up with rigid observance of printed formulæ. But how did all this serve them when they came to develop a large batch of exposed plates, including subjects of all imaginable characters, made hap-hazard in all sorts of lights, in season and out of season?

While some successes were obtained, failures were numerous, proving that the knowledge wanted was the special photographic knowledge of such things as the strength of the light, the character of the subject and how it was lighted, the choice

of the point of view, the choice of a suitable stop in the lens, how to focus the lens, and indeed what lens to use, as well as what exposure to give to the plate.

The nice exactitude with which a trained chemist would weigh out and mix up a lot of ferrous-oxalate developer, for instance, could never be as photographically valuable as even a modicum of experience in such points as its temperature, the time it is allowed to act, and the proper amount of restrainer to be added to suit the exposure, and the particular make of plate used. And if such a man attempted printing, he would find that rigorous observance of formulæ and chemical niceties in compounding the different solutions were literally of no value whatever. The experienced printer pays attention to the quality of the paper, to its thickness or thinness, to the time required by the silver solution to penetrate its albumen coating, to the temperature of the drying-room, and of the toning and fixing baths and wash waters, to the time the ammonia fumes are allowed to act, and to the peculiar effects they produce on different samples of paper, and numerous other practical details. It would be quite possible for a good printer to compound all his solutions without scales, weights, or measures, and an observant man could do the same even in such an intricate process as wet collodion. Indeed, as we write, we remember the answer made by the celebrated Mr. G. W. Wilson, of Scotland, to an anxious inquirer about his formula for iron developer. It was about this: "Take a handful of sulphate of iron, a cupful of acetic acid, and fill up the bottle with water; there you are." So it was indeed, but we must add for candor's sake, that Mr. Wilson used one particular bottle and developing cup in his work, and knew very closely the contents of each, so that he really worked with great accuracy. If his friend had asked him how he continued to hit the exposures of his plates so accurately that he rarely made a miss, even in the tricky light of a country like Scotland, the answer forthcoming would have been of a very different kind.

A man who takes up photography must remember that he works *to produce a certain effect*, and not to prove that this or that plate or formula may be utilized. We have no doubt that many of our readers will laugh at such a truism as this, but if they had been questioned as we have been by men of first-class education and attainments on very simple photographic matters, and heard them say with a sigh, "Well, I confess I cannot learn photography," they would not wonder at our writing it. Nor need we apologize for reiterating a well-worn piece of advice on the subject of timing the plate; we say, lay in a large stock of plates of one or two standard makes. Select those stops in the lenses used that will give the necessary sharpness. Then, having these two known quantities to start with, *study the subject and the light in which it is made*, and guess for the required exposure. Do not attempt to calculate it out by mans of "exposure-tables," which are simply useless for this or for any other purpose.

In concluding these observations, we would also ask professional artists, intending to take up the camera, to remember that they will have to learn to use their eyes in photography in a manner different from their former habits, and that many a landscape or other subject, attractive enough to the eye, will be quite ineffective when photographed.

ELLERSLIE WALLACE.

ON THE ABSORPTION OF THE MOST REFRANGIBLE RAYS BY THE ATMOSPHERE.

THE following valuable communication has been sent to us for publication in THE AMERICAN JOURNAL OF PHOTOGRAPHY by the distinguished experimenter, Mr. V. Schumann, embodying the result of his recent investigations in the department of spectral physics, and will be of special interest to our scientific readers, for whom we prepare the following translation.

TRANSLATION.

The most refrangible rays of light with which we are so far acquainted belong to the light from incandescent aluminium. Next in order come the rays from incandescent zincs. According to the investigations of Cornu the rays from both these sources are speedily and energetically absorbed by the atmosphere as soon as they travel through an extent of only ten metres. According to the same authority, for the absorption of rays of wave length 211.84 mill-millimetres a lamina of air of ten metres thickness is sufficient, and for those of wave length 184.21 mill-millimetres only a lamina of one metre thickness.

I have for a number of years been engaged with spectral photography, and have endeavored repeatedly to photograph the most refrangible portion of the spectra of zinc and aluminium. I have succeeded in securing impressions of the former, but not of the latter.

The most refrangible lines of aluminium, Nos. 30, 31, 32, have never, even with the most powerful electric arc, produced an impression upon my sensitive plate. With the lines of zinc, Nos. 27, 28, 29, I have without very great trouble succeeded, but only when I exposed considerably longer with the more intense illuminator, as, for example, with the neighboring lines of cadmium, Nos. 24, 25, 26.

Quite recently I found occasion to again undertake the photographing of this spectral region. I observed that the condenser employed to concentrate the light in the slit of my spectroscope gave a much better effect when I put it further off from the focus of the refrangible rays of the spectrum than when I placed it, as heretofore, for rays of greater wave length.

This observation I made at first by aid of the fluorescent spectrum as afforded with a disk of uranium glass, which is placed in the focal area of the telescope, or rather camera lens of the spectroscope.

The most decided effect in the fluorescent spectrum gave reason to expect that also the photograph from the changed application of the condenser would show advantage, and this circumstance was the occasion for the repetition of my experiments with the ultra violet end of the zinc and aluminium spectra.

The spectroscope which I employed consisted in its optical parts only of quartz. The prism was cut from right- and left-handed quartz, and in such a manner as to be right-angled to the crystalline axis, the two halves of the prism touching in the bisecting plane of the refractive angle, and this plane perpendicular to the crystalline axis.

If the prism should be made either of right- or left-handed quartz it is useless;—it doubles the spectral lines in consequence of the circular polarisation.

The lenses for collimator and camera had focus 750 mm. (Fraunhofer line D); they were likewise cut right-angled to the axis, and plano-convex in form.

Two cylindric lenses, from 80 to 160 mm. focus, so placed that their geometric axes crossed under an angle of 90°, and the axis of the first directed parallel to the slit of the spectroscope, united the light rays of the spark in the opening of the slit.

My electric apparatus was composed of two chromic acid elements, one induction coil, giving spark 8 cm. long, and a Leyden jar 30 cm. high. I have made only preliminary use of this apparatus, and will hereafter employ my induction coil for sparks 25 cm. and 50 cm. in length.

The photographic plates were made by myself. One-half of the plate consisted of a film of pure bromide of silver gelatine, the other half of gelatino-bromo-iodide of silver (100 AgBr + 9 AgI.)

Both emulsions were placed in a straight line, which formed the middle of the plate.

Now it will be seen that if I photographed the spectrum upon the middle of such a plate it would fall upon both emulsions, and I could after development see which was the most suitable for receiving impressions of the spectral region.

My results were favorable beyond expectation. With a few seconds' exposure I was enabled to photograph the first lines belonging to the spectral region between the zinc lines 27 and 29. After three minutes all the lines appeared.

The aluminium spectrum demanded a longer exposure; nevertheless in 45 minutes there appeared (the induction coil working very energetically) all the lines of the same, the most refrangible not excepted.

The lamina of air which these rays penetrated before they reached the photographic plate must have had a thickness of two metres.

After these favorable results I removed the electric spark to 17 metres from the sensitive plate, and repeated the experiment.

The rays from the zinc found in the 17 metres so considerable resistance that only after 20 minutes' exposure the most refrangible zinc line appeared.

With aluminium light I was this time less satisfied; an exposure of an hour and a half, with a very powerful spark, gave not even a trace of one of the aluminium lines lying beyond the zinc lines, 202.43.

If now with this last exposure the absorption through the air has become manifestly apparent, it follows that the experiments of Cornu on the absorption of the most refrangible rays by the atmosphere are not satisfactory, and that the latter is by far more penetrable than the experience of Cornu indicates.

In conclusion I revert to my plates. Of two emulsions treated analogously, the one being composed of bromide of silver, the other containing a percentage of iodide of silver, it will be found that the latter shows a greater sensitiveness for the registering of the prismatic spectrum.

This was the case with my two emulsions. I observed, however, that this difference decreased the more, the more I approached the last lines of the aluminium, and the aluminium line No. 32 appeared upon the iodide half of the plate scarcely any sooner than it did upon the half of the plate which contained the bromide of silver film.

V. SCHUMANN, Leipzig, Germany.

THIRD ANNUAL EXHIBITION OF PHOTOGRAPHY AT PHILADELPHIA.

(*Continued from last issue.*)

IN genre and still-life photography, the inventive faculty has a much broader scope for exercise of its function than in the province of landscape. The material from which the photographer builds up his pictures is more under control, and, consequently, he has more room for the exercise of his talent in composition. He is not forced, as in landscape photography, to select the best material possible under the circumstances, and be satisfied with the results, though not just what an artistic sense would demand in a picture. The genre photographer can combine and contrast and re-arrange to his heart's content, until the idea he has in his mind's eye is definitely bodied forth.

It is for these reasons that the artistic feeling in photography is more manifest in figure composition than in any other branch, and the record of the progress the art has made better studied therefrom.

There were some notable examples of genre work amongst the exhibits at Philadelphia. We have already spoken of the beautiful work of Dr. Emerson and Mr. Sutcliffe. The work of Mr. and Mrs. W. J. Anckhorn, of Arbroath, Scotland, shows how well they understand the relation of things to one another so necessary to produce harmony of interest in a picture. Composition is making one thing out of several elements, often very diverse in themselves, nay, sometimes seemingly antagonistic, but capable of producing, when skilfully brought into relation, the most pleasing effect; the degree of beauty evolved being in proportion to the harmony called forth by the combination of the most widely divergent elements.

A poem is only made up of words—words which any one may pick out of the dictionary—but it is the order in which those abstract things are marshaled which makes the difference between a work of genius and the babbling of a fool. There is no design in a load of stone, dumped out of a cart; it is only when the stones are set in appropriate form in the beautiful edifice that we see the idea of the architect unfolded. And so in a painting or a photograph, a haphazard bringing together of all sorts of things without any "mitigation or remorse," does not entitle the result to a place in art. A picture is an outcome of the study of the relation of parts to the harmony of the whole. Now this is just what we find done so masterfully in the photographs by Mr. and Mrs. Anckhorn. No. 577, "Auld Robin Gray," as well as 578, and 579, are conceived with a true feeling for art, and seems to us possessed of more pathos than one could think possible to obtain in a photograph. This feeling is called forth by the beauty of expression in the subjects, and doubtless is due to the skill the artists possess in inspiring their models with an interest in the story told by the pictures.

No. 522, by W. N. Geddes & Son, of Arbroath, Scotland, entitled "News From Abroad," shows skill in double printing, but there is a lack of harmony in the different elements which disturbs somewhat the general effect. The figures seem to have no lot or portion in the scene wherein they are placed.

The works of Mr. Charles Edward Wyrall are excellent, technically considered, but the posing is a little too theatrical and melodramatic in effect, and hence rather inclined to be sensational in character. This is the more unfortunate, because the models selected are beautiful, and the themes chosen capable of pictorial rendering.

Alfred Stieglitz, Berlin, Germany, in his exhibit No. 605, shows much skill in imitation of a study of Murillo, both in posing of the figures and the management of light and shade. The imitation of the old master is very close, and makes us wish that Mr. Stieglitz had given us an original study in place of a copy, especially as his other examples show evidence of artistic feeling.

His "Returned," No. 600, showed skill in posing and management of accessories, but the picture was not suggestive of the title. His portrait work was excellent.

No. 27, "The Rehearsal," by John H. Tarbell, of New York, was well conceived, showing that a pleasing picture can be produced without adherence to the set rules of composition, provided the photographer possess the requisite taste in grouping his subjects in a natural manner.

The collection, by Mr. George B. Wood, of Philadelphia, was not up to the high standard of pictorial beauty he has hitherto displayed at exhibitions. There was a monotony in the subjects selected, and in several cases unpleasant effects produced by repetition of sharp angles in the pictures which the artistic eye of Mr. Wood should have detected at once. However, there were several subjects full of interest, and possessed of a sense of humor of which the artist has frequently given proof.

In the collection by Mr. John Bartlett, the subjects chosen were what might be called common-place—scenes and incidents from everyday life—yet the field seems to have afforded scope enough for expression of artistic taste. In all the groups the poses are easy and natural, and the action in perfect harmony with the surroundings. A simple theme, simply rendered, is infinitely preferable to an attempt at high art, which can result only in mawkish sentimentalism.

Mr. Henry Harrison Suplee, of Philadelphia, showed not only much artistic feeling in posing and arrangement of subjects, but also skill in the management of light and effect.

Mr. William H. Rau displayed a large collection of work—views of interiors, family groups, etc. His pictures of animals from the Zoölogical Garden were the finest of the kind in the collection, but their superb qualities as photographs would have shown to better advantage upon a different color mount. The card-board mat was almost identical in color with one of the shades of color of the photographs.

Mr. Rau's bromide enlargements were deserving of the special award they obtained. "A Misty Morning on New York Bay," was full of picturesque beauty.

Mrs. S. M. Cleveland, of Philadelphia, showed admirable technical work, which carried off a diploma for special excellence.

Mr. Alfred Clements, of Philadelphia, gives evidence of artistic taste in landscape, as well as sentiment in selection. The work was made in platinum by the hot and also by the new cold process, and looked beautiful in its rich variety of half-tones and vigorous shadows.

R. T. Hazzard had a rather large collection, some of the subjects being repeated on transparencies. "The Village Smithy," a well-conceived picture, was also excellent in technical qualities. Mr. Hazzard possesses a sense of humor which is delightful.

Dr. Charles R. Mitchell's large landscapes attracted much attention. Sobered tints of exquisite truth and broad chiaroscuro are the prevailing characteristics of his work. One hardly misses the charm of color; indeed, color is often suggested by

the beautiful gradation of tone. Especially is this the case in his picture entitled "A Vista—Fairmount Park."

Photography could not suggest more delightfully the glow of summer noonday than in the lovely work by Mr. Robert S. Redfield. The wealth of half-tints is remarkable, the large masses of gray serving as foils to the warm lights, while the deep shadows add contrast and vigor to the pictures.

Mr. Edmund Stirling's work shows most excellent technical qualities as well as artistic feeling in selection of subject.

Mr. Charles R. Pancoast had a very small exhibit, but he atoned for the paucity by the excellency of quality and the high artistic beauty of the pictures. "Home Revisited" equalled anything in the whole exhibit for refinement of sentiment and pathos in rendering.

The collection did not contain many instantaneous views, strictly speaking. Those of David Pepper, representing athletes walking, were remarkably good. The photographs were enlarged from 4x5 plates, but showed excellent detail and definition.

For portraiture there were some very good examples by amateurs, which for originality in posing, and artistic handling of accessories, far outdid ordinary professional work. Mr. Edward Leaming's, "Marie Stuart, Queen of Scots," deserves special notice for its technical qualities. No. 602, "A Portrait Study," and 599, "Princess of Bellagio," by Alfred Stieglitz, of Berlin, were full of artistic beauties. H. A. Latimer, of Boston, showed a number of excellent portrait studies, varied by originality of posing, and remarkable for the rich gradation of light and shade.

Professional portraiture was poorly represented, but the little which was shown was of the highest class. The representatives were F. Gutekunst, A. K. P. Trask, and Rothengatter & Dillon, all of Philadelphia.

THE WALK IN HEALTH AND DISEASE AS REVEALED BY PHOTOGRAPHY.

FRANCIS X. DERCUM, M.D., PH.D., instructor in Nervous Diseases at the University of Pennsylvania, in a paper read at the University gives the results of his investigations of the walk and some of its phases in disease, based upon the Muybridge investigations.

The author says that the normal walk possesses an interest that is general, and that he believes the Muybridge method has in this field, as in others, yielded new results.

In order that the various abnormal gaits should be properly understood, a study of the normal walk had first to be made. In this connection it is hardly necessary to refer to the work of the Weber brothers, nor to the earlier results of Marey and Carlet, for they are already the common property of schools and text-books. In more recent years, as is well known, Marey invoked the aid of photography to enable him to confirm and add to his original results obtained by the graphic method. His photographs, however, were confined simply to the analysis of the vertical and forward movements of various points of the body, and they gave no information whatever of the direction or extent of the lateral sway. Marey was well aware of this, and by a most ingenious application of the stereoscope to his pho-

tographic wheel he endeavored to remedy this defect. The pictures that he obtained are exceedingly interesting, and when examined stereoptically give one the impression of an undulating white band extending through space, the undulations being in three directions, forward, vertically, and laterally. His achievement was indeed a brilliant one, and yet the pictures do not admit of a detailed study of the curves.

However, the method invented by Muybridge, of making simultaneous serial photographs of a moving man or animal from two points of view at right angles with one another, has yielded pictures furnishing all of the elements necessary to determine the various paths of motion. It must, however, be admitted that while by this method the lateral sway is quite definitely ascertained, there is a slight loss in the accuracy of the curve of the vertical and forward movements, and this arises from several causes. In the first place, a possible and probable source of error is slight irregularity in the intervals of time between the successive photographs of a series. No one would pretend that the same accuracy as regards regularity in the sequence of exposures could obtain in a serial battery of cameras as in such an apparatus as used by Marey, in which the sequence of exposures was determined by the fenestra of a revolving wheel. Notwithstanding, repeated chronographic measurements made by Muybridge showed the irregularities of these intervals to be exceedingly small even for very rapid movements. Therefore in a movement relatively so slow as the walk they can be practically discarded.

Another cause for slight loss of accuracy arises from the fact that the person walking cannot be in exact apposition with the lateral background which is used as a scale. This error is, of course, lessened by the use of lenses of long focus,—*i. e.*, in the lateral battery of cameras, which was placed upward of fifty feet from the track. Being by this means so much diminished, it can also be discarded. A third source of inaccuracy is due to the fact that the various phases of any movement photographed cannot be, except by improbable accident, directly in front of the centre of each corresponding camera. Therefore each individual phase, instead of being photographed from a position exactly at right angles to the background, is doubtless in the majority of instances photographed at an angle varying slightly from the right angle. Furthermore, for the various phases, this angle is a variable and indeterminate quantity. However, it must again be insisted that for the majority of movements, especially slow movements, such as walking, this error is also small, though it is obviously greater than the second error just mentioned.

Taken all in all, while the serial method gives slightly less accurate results regarding the rise and fall and onward movement of a limb, it more than compensates for this loss—which in itself is slight—by enabling us to determine the amount and direction of the lateral sway. Furthermore, apart from the mere determination of trajectories, two photographs of any one phase of movement taken at right angles give us an opportunity for the study of the action of a part which a wheel-photograph can in no way furnish.

The model was a young man of medium height, and was photographed while taking a long step.

By means of a transparent scale identical with that of the background, the vertical and forward movements of various points of the body were readily studied.

The lateral sway was determined by means of a transparent scale based upon the broad divisions of the background at the end of the track,—that is, the distance between the heavy white lines, which is equivalent to thirty centimetres, was taken as the basis of the scale; but for greater accuracy this distance was divided into ten parts instead of into six, as in its original background. A plan of the track was then made, and the scale corrected for the error in perspective for the area in which the step was taken. The rise and fall and onward movement was represented by the curve indicated by the movement of a white button in the cap worn by the subject; the amount and direction of its lateral sway was also represented by another line.

As in the trajectory of the pubis determined by Marey, the number of vertical oscillations appear to be double those which take place in a horizontal direction.

The rise and fall of the right superior spinous process of the ilium, is also represented by a line. It is similar in general course to the line representing the rise and fall and onward movement, but the amplitude of the wave is much greater, This increase in amplitude is doubtless in part due to the meagre lateral oscillation of the ilium during the time the right foot is fixed upon the ground.

A line also represents the rise and fall and forward movement of the left foot, the internal malleolus being taken as a definite point. This curve is made up of a number of elements. The curve begins by the malleolus sweeping upward on an arc the radius of which centres in the ball of the great toe. At the next instant the centre of rotation is transferred to the tip of the great toe. The balance of the curve up to its highest point is the result of the flexion of the leg and of the forward movement of the pelvis; thence to the final impact of the heel upon the ground the curve is the resultant of a complex movement, in which three principal elements are distinguishable: first, a *pendulum movement*; second, a *fall*; and third, a *forward movement*, the latter being due to the movement forward of the body as a whole. The first two elements are those of a cycloid, and the foot therefore falls to the ground, other things equal, *along the line of swiftest descent.*

A fourth element is observed in the slight secondary rise occurring in the curve just previous to its termination. The significance of this rise is as follows. We notice that the heel of the passive leg in swinging forward in its cycloid-like descent does not immediately strike the ground, but that just previous to the impact it again makes a slight ascent. We should observe at the same time that the rate of motion is not by any means uniform. It is relatively slow in the beginning, but steadily increases in velocity until the step is almost completed, when a slowing of movement again takes place. This slowing of movement is coincident with the secondary rise. The impact of the heel upon the ground is then made without any waste of force and with a minimum amount of jar. When, in addition, we reflect that the heel is but a portion of a moving lever and that the muscles attached to this lever are elastic, we realize that the jar of impact is indeed reduced to a minimum.

It is further of interest to note that the weight is rapidly transferred to the outer edge of the foot and thence again to the ball of the great toe preparatory to the next propulsive effort. A complex rotatory movement of the foot therefore takes place.

The curves of the lateral sway are also exceedingly interesting. The fact that the lateral sway of the head is greater than that of the hip is exactly in keeping with what we should expect on *à priori* grounds. The pelvis is relatively fixed, and not

nearly so free to move as the head or upper portions of the trunk; and, secondly, the tilting of a column is naturally exaggerated at its upper and free end.

The lateral sway of the foot again presents an interesting interpretation. Its extent is less than most of us would have expected to find, being in fact very small. This signifies undoubtedly that the extent of the lateral sway is, other things equal, always the least possible consistent with the working of the limb; because, first, the greater the lateral sway the greater the loss of time consumed in again bringing the foot to the ground; and, secondly, the greater the lateral sway of the foot the greater the lateral sway of the body as a whole, and the greater the loss of time and force at the expense of the forward movement.

Finally, taking all of the trajectories together, it is evident that the movements in the three directions, forward, vertically, and laterally, are correlated. Secondly, the prime object of the walk being movement in a forward direction, it follows, other things equal, that the greatest economy of time and force obtains when the vertical and lateral movements are reduced to a minimum. This is apparently the case in the normal walk.

The author then investigates the walk in disease, showing the difference between the normal gait and the gait in locomotor ataxia. It needs but a superficial glance at the curves to see the marked difference from the course taken by the normal foot in motion. The external malleolus was selected as a relatively fixed point.

The striking difference between the line of the abnormal gait in locomotor ataxia, representing the rise and fall and onward movement, and the corresponding line in the normal walk, consists in its irregular and extensive outward sway, while in the lines representing the amount and direction of the lateral sway, the difference between the abnormal and normal gait consists in the increased amplitude of the curve and its irregularity in the downward fall. Flexion of the leg is much more marked than in the normal condition. The fall of the foot to the ground is somewhat irregular; the heel failing to make the slight ascent which occurs in the normal walk, just before the impact on the ground, and finally when the impact does take place it is made by a sudden descent or fall.

The writer does not by any means desire to give the reader the impression that the curves indicate the invariable path through which every ataxic must move his feet, but he does insist that the two principal factors indicated,—namely, the increasd lateral sway and the increased height to which the foot is raised,—are constant. To these must be added the irregularity of movement, as irreg ularity is itself an essential feature of ataxia.

To show how difficult it is to observe a moving limb, even when the movement is slow, it need only be stated that medical writers almost without exception describe this gait erroneously. Almost all lay stress upon rigidity of the leg and insufficient action of the knee-joint. It needs but a hasty examination of the photographs to show how utterly wrong this view is. Every one of the plates reveals the action of the knee-joint, and in fact of all of the joints, to be far in excess of the normal; and, further, the rigidity is *simulated* and not real. Doubtless this erroneous view has its origin in the difficulty of separating mentally the active from the passive phase of the leg.

Regarding the action of the foot and the manner of its impact on the ground var-

ious accounts have been given, some writers maintaining that the heel strikes the ground first and considerably in advance of the plantar surface, and others maintaining that the entire sole strikes the ground at once. An examination shows that the manner of impact probably depends upon the degree of the ataxia. In the upper series, in which the patient was photographed while having the guidance afforded by his eyes, the heel impinges distinctly before the sole, while in the lower series, in which the patient walked with closed eyes, the entire plantar surface impinged at the same time. Occasionally the toes come down first and sometimes even the heels, so that in advanced ataxia any part of the foot may strike the ground first.

Regarding the lateral sway of the trunk, it needs no detailed study to tell us that it is much exaggerated. In ataxics who are still able to walk comparatively well this exaggerated sway is always toward the side opposite the advancing or passive leg. However, if the ataxia be increased, the sway may be toward the same side, and then the patient is in danger of falling.

Dr. Dercum gives interesting accounts of his investigation of the movements in other nervous diseases,—epilepsy, hysteria, etc.; but we cannot enter into the subject any further, enough having been cited to show how indispensable is the aid of photography in the scientific study of this most important and interesting department of medicine.

A TALK BEFORE THE BOSTON CAMERA CLUB ON COLLODION EMULSION.

THE enthusiasm of the Camera Club in the matter of lantern slide making, and a desire that you may see and know for yourselves the ease with which collodion emulsion is prepared, are probably the principal reasons why your secretary has invited me to give a talk on the subject.

I have seen shown here lantern slides made by the wet plate process, and also some made on gelatine dry plates, but none on collodion emulsion plates.

It cannot be such plates are unknown to you, but rather, I think, to the belief that to prepare them is a difficult as well as a delicate matter. Herein you are in error, for, as you will shortly see, the preparation of the emulsion is comparatively an easy task.

The principle to be followed in the preparation of the emulsion is to employ a considerable excess of soluble bromides. Those of you who are familiar with the formula for gelatine emulsions only must not think that the same rule holds good in collodion, for such is not the case. In the former it is generally held to be immaterial how much excess of bromide, within reason, is used, but in a collodion emulsion every grain must be taken into account in estimating the probable sensitiveness of the preparation. What in the case of gelatine would be a small excess, in collodion would be a very large one.

The formula which I have used is:

Cadmium bromide,	30 grains.
Ammonium bromide,	15 "
Alcohol,	2 ounces.
Sulphuric ether,	2½ "
Pyroxaline,	20 grains.

Put the cadmium and ammonium bromide into a six-ounce bottle, and add the alcohol and ether. A vigorous shaking for a few minutes will dissolve a greater part of the bromides. The pyroxaline should then be added to the bromized solution, which should be allowed to stand for a day or two, being shaken occasionally, when it is ready to be sensitized. To sensitize the above quantity, dissolve in a test tube, by heat, fifty grains of silver nitrate in half a dram of water, and add two drams of alcohol, previously heated in another test tube. The alcohol solution of silver is added, a little at a time, to the bromized collodion with vigorous shaking, and the test tube finally rinsed with two drams of alcohol, which is added to the emulsion, making five ounces in all. Of course the sensitizing of the collodion should be done in the dark-room, although it is not necessary to be as particular as to the light as with gelatine emulsion. You can allow yourself a very liberal quantity of either yellow or red light.

When the emulsion is first made it is rather thin and blue, but if set aside, protected from the light, of course, for about a week, it ages or ripens, and becomes creamy in appearance. To a certain extent age improves it, but it is not advisable to use it after it has been kept as long as three months. The emulsion having ripened, should be filtered through cotton wool, a plug of which should be loosely put into the neck of a glass funnel and moistened with alcohol before using.

The plates which it is proposed to use should be thoroughly cleaned, dipped into an albumen solution and set aside to drain and dry. The albumen solution is made by dissolving, by the aid of vigorous shaking, the white of one egg in three pints of water and filtering through cotton as previously described.

After flowing the plate, allowing the excess or emulsion to run off, but not back into the emulsion, and, after the film has set, wash in several changes of water, or under the tap, until the seeming greasiness disappears, when it should be flowed with the preservative, which may be strong tea or coffee or a solution of quinine made of:

Tincture of quinine, ... 2 drams.
Water, ... 5 ounces.

After allowing the plate to drain for a few minutes, dry at once, and preferably by heat. I dry in the oven of a cook stove, being careful that it is only moderately hot.

The plate, having been exposed either to artificial light for a contact plate, or in the reducing camera, is ready for development.

The exposure should be about four times as long as that given a very slow gelatine plate. You must bear in mind that collodion emulsion cannot stand the amount of alkali in development that gelatine can.

The solutions required for development are:

Water, ... 1 ounce.
Pyro, ... 3 grains.

and for an alkali, any which you are accustomed to use and have on hand, either ammonia or potash.

In addition will be needed a solution of alcohol two parts, water one part. Place the exposed plate on a leveling stand; a small graduate or tumbler will do as well. Flow over it the alcohol solution, allowing it to remain on the plate for

about a minute, which softens the film; then pour it off, and wash with water until it will flow evenly over the surface. Having put into a graduate the quantity of pyro solution you propose using, add to each dram of it two drops of alkali, and flow it over the plate. The image will develop up with little of density, being seen by reflected light to be of a bluish-pink color; by transmitted light scarcely at all. When the detail is well out pour back into the graduate the developer on the plate, and having added two drops more of alkali to each dram of pyro, again flow the plate, pouring the developer on or off until requisite density is obtained, then rinse with water and fix in comparatively weak hypo, say one to six.

It takes fully as long to describe how to develop as it does to develop.

I have never heard of hydroquinone being used as a developer for collodion emulsion, but as it is composed of bromide of silver, could see no reason why, as it would develop gelatino-bromide plates, it would not also the collodion emulsion. I tried the following:

Water,	2 ounces.
Hydroquinone,	10 grains.
Soda sulphite,	30 "
Potassic carbonate,	60 "

Taking equal parts of it and water, the result was fully equal to that obtained by using pyro. It is necessary, however, in using hydro to overtime rather than undertime, as forcing the development has a tendency to fog or veil the high lights.

An advantage which the collodion emulsion has over gelatine is that if, from any cause, the plate, after developing and fixing, is weak and flat, it can be intensified like a wet plate, that is, you intensify only the dark portions, the lights remaining clear. To do this flow the plate with a solution of one and a half grains of pyro to the ounce of water, to which has been added a few drops of a solution composed of:

Silver nitrate,	30 grains.
Citric acid,	20 "
Nitric acid,	10 drops.
Water,	1 ounce.

Be careful not to use this too freely, or a bad color and coarse image will result.

If desirable, the plate may be toned by using the spent gold bath which has been previously used for toning prints.

Apropos of the above, we have used the following gelatine emulsion with good success in lantern-slide making, it being about one-quarter the rapidity of Carbutt's B plates. Into a tumbler put of

Potassic bromide,	56 grains.
Heinrich's gelatine,	30 "
Water,	3 ounces.

Heat in a water bath to 130 degrees, and, when all is dissolved, add slowly, with constant stirring, sixty grains of silver nitrate, previously dissolved in one ounce of water; put aside to set. When thoroughly set, we generally wait until the following day; shred by pressing through what is called railroad canvas; wash in four or five changes of water; drain; re-melt; filter through fine flannel, and coat plates, allowing one dram of emulsion to each of lantern-slide size.

E. MILLIKEN.

CAMERA CLUB OF ROCHESTER.

THE regular meeting of the above club was held at their rooms, on East Main street, Thursday evening, April 25th. President G. H. Croughton in the chair.

Minutes of the previous meeting having been read and confirmed, a communication was read from the New York Amateur Society, offering the use of their dark-room, etc., to any member of the club who might visit New York during the Centennial. The routine business having been finished, the President gave a very interesting and instructive lecture upon "Art in Photography." The lecture was illustrated by magic lantern views; the subjects being chosen especially to illustrate the points in the lecture upon linear composition and composition of light and shade.

In the course of his lecture Mr. Croughton said, that "the first thing that an amateur possessed of a camera did was to perfect himself in the chemical manipulation, but found when that was done that there was something more than clean manipulation required to make a picture." He went on to explain the different terms used by artists, and, describing the qualities of breadth, concentration, and composition, said that a photograph might have the artistic quality of focus, and yet not be photographically sharp in any one part, while another might be perfect as a photograph, sharp and distinct in every detail, and yet lacking in the essential qualities which make a picture.

This caused some discussion, Mr. Peter Mawdsley arguing that a photograph should be sharp in every plane, and that for himself, in making a view, he wished to get the foreground, middle, and even the distant mountains, as sharp as it was possible to get them. Mr. Croughton argued that the special quality of concentration in the picture was not any arbitrary art rule, but the result of centuries of studying by men who have given their lives to the study of nature and the representation of it pictorially; that the human eye, being the most marvelous optical instrument, can adjust itself to different focuses with the greatest rapidity, and that if any of the members would try experiments they would become convinced that if they fixed their eyes, say, for instance, upon an oak tree, making that the principal object of the picture, that is, concentrating their gaze entirely on that oak tree, they would see, it is true, the other parts of the landscape, but certainly not so sharp nor so distinct as the object upon which they were gazing. If they moved their eye to any other part of the landscape, that point at once became the centre of interest, and the other point, the oak tree at which they had been looking before, became subordinate to the central object of interest.

Several views were shown in which this principle was carried out in the photographs, and a lively discussion ensued. But in the end it appeared that the opinions were about unanimous; Mr. Mawdsley's objections being simply that if he wished to make a photographic transcript of a scene, he should use the smallest stop to get every part in focus. But if he was aiming at a photographic picture, he should follow out the idea that Mr. Croughton had advocated. The lecture was listened to with a great deal of attention, and many expressions of interest were elicited. Some slides made by different members were exhibited, and Mr. Croughton pointed out where improvements might have been made by covering up portions of the slides,

and in this connection he depreciated the adherence too rigidly to the photographic sizes, showing how a certain picture was vastly improved by making it a long, narrow picture, and cutting out obtrusive reflections in the water. One had been spoiled pictorially by the strict adherence to the regulation 3¼ square.

The lecture was a great success, being a masterly exposition of art rules, as applied to the taking of photographs, in a manner which was understood by all.

THE PHOTOGRAPHIC SOCIETY OF PHILADELPHIA.

MINUTES of the stated meeting held Wednesday evening, May 1st, 1889, the President, Mr. Frederic Graff, in the chair.

The Secretary reported the receipt of a circular containing the program of the International Congress of Photography, to be held in Paris, France, during the Exposition of 1889, and inviting the attendance of members thereto.

It was also reported that a number of picture exhibits, by Mr. Frank M. Sutcliffe, at the late Exposition, had been presented by him to the Society, and a vote of thanks was passed for the same.

The Committee on Membership reported the election of the following active members: Dr. James J. Nelson, William A. Sullivan, John H. Bradway, Daniel W. Grafly, Dr. Samuel D. Risley, J. H. Hooven, Walter R. Furness, Rev. Henry A. F. Hoyt, William Howard Turner, Joseph Gray Martin.

Mr. W. E. Barrows showed some excellent cabinet portraits made by means of the Welsbach light, by Mr. Rockwood, New York.

Dr. Charles L. Mitchell showed and described Barnett's Universal Film Carrier, adapted for using celluloid films in ordinary plate holders.

Mr. Morris Earle showed one of the Hawkeye Detective Cameras, fitted with a roll holder for paper negatives, and also for use with ordinary holders containing glass plates or films.

He also showed some transparencies called by the makers (Messrs. Williams & Brown) "Linotypes." They were photographic prints on linen mounted as transparencies, with washes of color applied to the back, giving them a pleasing tinted effect.

Mr. Burrows showed an improvement on the flash lamp exhibited by him at a recent meeting, in which the usual rubber tube and bulb were done away with. A spring, released at the proper moment, threw the flash powder upward and outward into the flame. This arrangement allowed the lamp to be constructed in very compact form. The lamp shown was adapted for use with ten to twelve grains of powder.

Adjourned.

ROBERT S. REDFIELD,
Secretary.

SCIENCE AND ART.

Read before the Third Annual Conference of the London Camera Clnb.

MR. PRESIDENT, LADIES, AND FELLOW PHOTOGRAPHERS:—Before beginning this paper I would fain ask of you two things,—your attention and your charity, but especially your charity. The reception which you accord me, ladies and gentlemen, assures me you will give both, and I thank you beforehand.

Since all mental progress consists, as Mr. Herbert Spencer has shown, for the most part in differentiation,—that is, in the analysis of an unknown complex into known components,—surely it were a folly to confuse any longer the aims of Science and Art. Rather should we endeavor to draw an indelible line of demarcation between them, for in this way we make mental progress, and Science and Art at the same time begin to gather together their scattered forces, each one taking under its own standard those powers that belong to it, and thus becoming integrated, and necessarily stronger and more permanent; for evolution is integration and differentiation passing into a coherent heterogeneity. Now, I do not mean to premise that the confusion between Science and Art exists everywhere,—it does not. But I feel sure that it exists largely in the ever-increasing body of persons who practice photography. The majority of these have not thoroughly, nay, not even adequately, thought the matter out. It is obvious then, according to the teachings of evolution, that, if we are to make progress, this differentiation must be made, thoroughly understood, and rigidly adhered to by every practitioner of photography. Each one must have his aim clearly stamped upon his mind, whether it be the advancement of Science or the creation of works whose aim and end is to give æsthetic pleasure. Proceed we now to analyze the difference between the aims and ends of Science and Art.

Let us first approach the subject from the scientific standpoint.

Assuming that we have before us a living man, let us proceed together to study him scientifically, for the nonce imagining our minds to be virginal tablets, without score or scratch. Let us proceed first to record the color of his skin, his hair and eyes, the texture of his skin, the relative positions of the various orifices in his face, the number of his limbs, the various measurements of all these members. So we go on integrating and differentiating until we find that we have actually built up a science,—ethnology. If we pursue the study, and begin to compare different races of men with each other, we find our ethnology extends to a more complex anthropology.

We next observe that the eyelids open and close, the lips open, sounds issue from the mouth, and our curiosity leads us to dissect a dead subject, and we find that beneath the skin, fat, and superficial *fasciæ*, there are muscles, each supplied with vessels and nerves. We trace these vessels and nerves to their common origins, and are led to the heart and brain. In short, we find the science of anatomy grows up under our hands, and if we go on with our studies we are led into microscopy. Then we begin to ponder on the reasons why the blood flows, on the reasons why the *corrugator supercilii* and *depressores anguli oris* act in weeping, the *musculus superbus* in expressing arrogance, and the *lavator anguli oris* in snarling or sneering. So we go on studying the functions of all the organs we find in our man, and lo! we are deep in

physiology; and if we go deep enough, we find the thread lost in the most complex problems of organic chemistry and molecular physics. And so we might go on studying this man; and if our lives were long enough, and if we had capacity enough, we should be led through a study of this man to a knowlege of all physical phenomena, so wonderful and beautiful is the all-pervading principle of the conservation of energy, and so indestructible is matter. As we proceeded with our studies we should have been observing, recording, positing hypotheses, and either proving or disproving them. In all these ways we should have been adding to the sum of knowledge. And in the greatest steps made in our advancement we should have made use of our *constructive imagination*,—the highest *intellectual* power, according to recent psychologists.

The results of these investigations, if we were wise, would have been recorded in the simplest and tersest language possible, for such is the language of Science. It is needless to point out that in these records of our studies, as in the records of all scientific studies, *too many* facts could not possibly be registered. Every little fact is welcome in scientific study, so long as it is true. And thus the humblest scientific worker may help in the great work; his mite is always acceptable. Such is, alas! not the case with that jealous goddess, Art; she will have nothing to do with mediocrity. A bad work of art has no *raison d'être*; it is worse than useless,—it is harmful.

To sum up, then, "Science," as Prof. Huxley says, "is the knowledge of the laws of nature obtained by observation, experiment, and reasoning. No line can be drawn between common knowledge of things and scientific knowledge; nor between common reasoning and scientific reasoning. In strictness all accurate knowledge is science, and all exact reasoning is scientific reasoning. The method of *observation* and *experiment* by which such great results are obtained in science is identically the same as that which is employed by every one, every day of his life, but refined and rendered precise."

Now let us turn to Art, and look at our imaginary man from the artistic standpoint. Assuming that we have learned the technique of some method of artistic expression, and that is part of the science we require, we will proceed with our work.

Let us look at the figure before us from the sculptor's point of view. Now what is our mental attitude? We no longer care for many of the facts that vitally interested us when we were studying the man scientifically; we care little about his anatomy, less about his physiology, and nothing at all about his organic chemistry and molecular physics. We care nothing for his morality, his thoughts, his habits and customs,—his sociological history, in fact; neither do we care about his ethnological characters. If he be a good model, it matters little whether he be Greek, Italian, or Circassian. But we do care, above all, for his type, his build, and the grace with which he comports himself; for our aim is to make a statue like him, a statue possessing qualities that shall give æsthetic pleasure. For the *raison d'être* of a work of art ends with itself; there should be no ulterior motive beyond the giving of æsthetic pleasure to the most cultivated and sensitively refined natures.

The first thing, then, we must do is to sit in judgment on our model. Will he do for the purpose? Are his features suitable? Is he well modeled in all parts? Does

he move easily and with grace? If he fulfils all these conditions, we engage him. Then we watch his movements, and seize on a beautiful pose. Now with our clay we begin to model him. As we go on with our work we begin to see that it is utterly impossible to record all the facts about him with our material, and we soon find it is undesirable to do so,—nay, pernicious. We cannot model those hundreds of fine wrinkles, those thousands of hairs, those myriads of pores in the skin that we see before us. What, then, must we do? We obviously *select* some facts,—the most salient, if we are wise,—and *leave out* the rest.

All at once the fundamental distinction between Science and Art dawns upon us. We *cannot* record too many facts in Science; the fewer facts we record in Art, and yet express the subject so that it cannot be better expressed, the better. All the greatest artists have *left out* as much as possible. They have endeavored to give a fine *analysis* of the model, and the *Greeks* succeeded.

It is beside the question to show how Science has exercised an injurious influence upon certain schools in art; but that would be very easy to do. At the same time, the best Art has been founded on scientific principles,—that is, the physical facts have been true to nature.

To sum up, then, Art is the selection, arrangement, and recording of certain facts, with the aim of giving æsthetic pleasure; and it differs from Science fundamentally, in that as few facts as are compatible with complete expression are chosen, and these are arranged so as to appeal to the emotional side of man's nature, whereas the scientific facts appeal to his intellectual side.

But, as in many erroneous ideas that have had currency for long there lurks a germ of truth, so there lurks still a leaven of Art in Science and a leaven of Science in Art; but in each these leavenings are subordinate, and not at the first blush appreciable. For example, in Science the facts can be recorded or demonstrated with selection, arrangement, and lucidity,—that is the leaven of Art in Science. Whilst in Art the physical facts of nature must be truthfully rendered,—that is the leaven of Science in Art.

And so we see there is a relationship between Science and Art, and yet they are the poles asunder.

II.

We shall now endeavor to discuss briefly how our remarks apply to photography. Any student of photographic literature is well aware that numerous papers are constantly being published by persons who evidently are not aware of this radical distinction between Science and Art.

The student will see it constantly advocated that every detail of a picture should be impartially rendered with a biting accuracy, and this *in all cases*. This biting sharpness being, as Mr. T. F. Goodall, the landscape painter, says, "*quite fatal from the artistic standpoint.*" If the rendering were always given sharply, the work would belong to the category of topography or the *knowledge* of places,—that is, *Science*. To continue, the student will find directions for producing an *unvarying* quality in his negatives. He will be told how negatives of low-toned effects may be made to give prints like negatives taken in bright sunshine; in short, he will find that these writers have a *scientific ideal*, a sort of *standard negative* by which to gauge all others. And if these writers are questioned, the student will find the *standard negative* is one in

which all detail is rendered with microscopic sharpness, and one taken evidently in the brightest sunshine. We once heard it seriously proposed that there should be some sort of *standard lantern-slide*. My allotted time is too brief to give further examples. Suffice it to say, that this unvarying *standard negative* would be admirable if *Nature* were unvarying in her moods; until that comes to pass there must be as much variety in negatives as there are different moods in nature.

It is, we think, because of the confusion of the aims of Science and Art that the majority of photographs fail either as scientific records or works of art. It would be easy to point out how the majority are false scientifically, and easier still to show how they are simply devoid of all artistic qualities. They serve, however, as many have served, as topographical records of faces, buildings, and landscapes, but often incorrect records at that. It is curious and interesting to observe that such work always requires a *name*. It is a photograph of *Mr. Jones*, of *Mont Blanc*, or of the *Houses of Parliament*. On the other hand, a work of Art really requires *no name*,—it speaks for itself. It has no burning desire to be christened, for its aim is to give the beholder æsthetic pleasure, and *not* to add to his knowledge or the *Science* of places, *i. e.*, geography. The work of Art, it cannot too often be repeated, appeals to man's emotional side; it has no wish to add to his knowledge — to his *Science*. On the other hand, topographical works appeal to his intellectual side; they refresh his *memory* of absent persons or landscapes, or they add to his *knowledge*. To anticipate criticism, I should like to say that, of course, in all mental processes the intellectual and emotional factors are inseparable, yet the one is always subordinated to the other. The emotional is subordinate when we are solving a mathematical problem, the intellectual is decidedly subordinate when we are making love. Psychologists have analyzed to a remarkable extent the intellectual phenomena, but the knowledge of the sentiments or the emotional phenomena is, as Mr. Herbert Spencer says, "altogether vague in its outlines, and has a structure which continues indistinct even under the most patient introspection. Dim traces of different components may be discerned; but the limitations both of the whole and of its parts are so faintly marked, and at the same time are so entangled, that none but very general results can be reached."

The chief thing, then, that I would impress upon all beginners is the necessity for beginning work with a clear distinction between the aims and ends of Science and Art. When the art-student has acquired enough knowledge—that is, *Science*—to express what he wishes, let him, with jealous care, keep the scientific mental attitude, if I may so express it, far away. On the other hand, if the student's aim is scientific, let him cultivate rigidly scientific methods, and not weaken himself by attempting a compromise with Art. We in the photographic world should either be scientists or artists; we should be aiming either to increase knowledge,—that is, science,—or to produce works whose aim and end is to give æsthetic pleasure. I do not imply any comparison between Science and Art to the advantage of either one. They are both of the highest worth, and I admire all sincere, honest, and capable workers in either branch with impartiality. But I do not wish to see the aims and ends of the two confused, the workers weakened thereby, and, above all, the progress of both Science and Art hindered and delayed.

III.

Next I shall discuss briefly the ill-effects of a too sedulous study of Science upon an Art student.

The first and, perhaps, the greatest of these ill-effects is the *positive* mental attitude that Science fosters. A scientist is only concerned with stating a fact clearly and simply; he must tell the truth, and the *whole truth*. Now, a scientific study of photography, if pushed too far, leads, as a rule, to that state of mind which delights in a wealth of clearly-cut detail. The scientific photographer wishes to see the veins in a lily-leaf and the scales on a butterfly's wing. He looks, in fact, so closely, so microscopically, at the butterfly's scales, that he never sees the poetry of the life of the butterfly itself, as with buoyant wings it disappears in marriage flight over the lush grass and pink cuckoo-flowers of *May*.

I feel sure that this general delight in detail, brilliant sunshiny effects, glossy prints, etc., is chiefly due to the evolution of photography; these tastes have been developed with the art, from the silver plate of *Daguerre* to the double-albumenized paper of to-day. But, as the art develops, we find the love for gloss and detail giving way before platinotype prints and photo-etchings.

The second great artistic evil engendered by Science, is the careless manner in which things are expressed. The scientist seeks for truth, and is often indifferent to the manner of expression. To him, "Can you not wait upon the lunatic?" is, as the late Matthew Arnold said, as good as "Canst thou not minister to a mind diseased?" To the literary artist, on the other hand, these sentences are as the poles asunder,—the one is bald truth, the other literature. They both mean the same thing, yet what æsthetic pleasure we get from the one, and what a dull fact is, "Can you not wait upon the lunatic?" There are photographs and photographs; the one giving as much pleasure as the literary sentence, the other being as dull as the matter-of-fact question. The student with understanding will see the fundamental and vital distinction between Science and Art as shown even in these two short sentences.

And now, ladies and gentlemen, I do not think I can do better than finish this section by quoting another passage from the writings of the late Matthew Arnold.

"*Deficit una mihi symmetria prisca*,—'The antique symmetry was the one thing wanting to me,' said Leonardo da Vinci, and he was an Italian. I will not presume to speak for the American, but I am sure that, in the Englishman, the want of this admirable symmetry of the Greeks is a thousand times more great and crying than in any Italian. The results of the want show themselves most glaringly, perhaps, in our architecture, but they show themselves also in our art. *Fit details strictly combined, in view of a large general result nobly conceived;* that is just the beautiful *symmetria prisca* of the Greeks, and it is just where we English fail, where all our art fails. Striking ideas we have, and well-executed details we have; but that high symmetry which, with satisfying delightful effect, contains them, we seldom or never have. The glorious beauty of the Acropolis at Athens did not arise from single fine things stuck about on that hill, a statue here, a gateway there. No, it arose from all things being perfectly combined for a supreme total effect."

CONCLUSION.

And now I must finish my remarks. I have not, perhaps, told you very much,

but if I have succeeded in impressing upon beginners and some others the vital and fundamental distinction between Science and Art, something will have been achieved. And if those students who find anything suggestive in my paper are led by it to look upon photography in future with a new mental attitude, something more important still will have been attained. For, in my humble opinion, though it is apparently but a little thing I have to tell, still its effect may be vital and far-reaching for many an honest worker, and if I have helped a few such my labor will have been richly rewarded indeed.

DR. P. H. EMERSON, in *The Journal of the Camera Club.*

THE LIMITS OF PHOTOGRAVURE.

Read at the Conference Meeting of the Camera Club.

HAVING been desired to prepare a paper on photogravure—*i.e.*, the production of intaglio plates in half-tone (although line subjects and maps are equally photogravure)—I desire to respond to the best ability that other demands will permit.

I propose in this paper to keep to the artistic aspect of the question, and so doing rather to point out the limits of the science as I have so often encountered them. Others, I am aware, frequently take a sort of pride in the capabilities of the method; but when the demands of taste have to be met, it does not allow one much time to think of anything but how to enlarge our field of work, and how to increase our production without losing quality.

Remembering that well-cut copper-plates never gave the number of impressions that were desired by engravers, and that steel-plates were introduced to remedy this defect, then remembering that photogravure plates are far weaker and shallower than even copper engraved plates, it will be seen that there was much to be done, and there still is much to be done, to make it perfect.

I would suggest that the making of a fine photogravure in steel be kept in mind as the desideratum of the future.

Of course, we steel-face all plates nowadays, however engraved, so only that they are made of copper. But any one who has had to work a plate hard knows the grief of wearing the precious film of iron (or, as it is called, steel) away. This protecting coat is the only thing that makes photogravure a possibility for book-work. And the wearing of it away is the one great hindrance to the long endurance of the plates. Partly by reason of the action of solvents in removing it, partly by incipient wear when it gives way, the second coat of steel is found always a greater load for the plate to put up with than the first—lights are smoother and darks are more leveled down to one uniform shade. This power of endurance of the first coat of steel then becomes the real limit of the number of fine first-class prints obtainable. The art of making a really good and yet thin steel face carries a deal along with it. We generally reckon 500, but often 1,000 are printed off one facing before it gives way.

It is rather hard to have to start in this tone, but it is really necessary to remove the common impression that once a copper-plate is manufactured an infinite number of the finest impressions can be produced as a matter of course. It is a great mistake, in the present condition of the art.

Let me now imagine a plate from Turner's "Liber Studiorum" before you, and I would say that, putting aside the enormous power of the bitten outlines, the mellow transparent tones are what we have to get. Remember that these plates are deeply cut into the copper by the mezzotint tool, which cuts sharper and deeper than holes made by chemical means. The result is that a transparent ink made with soft color, such as bitumen, or Vandyke brown, may be used instead of black and burnt umber. The result is that the deep plate gives a much softer and more glowing print than we do with our shallow chemical grains.

I do not think I can by all my power convey to an ordinary onlooker an idea of the great width and depth of the gulf that once separated the struggling processist from the technically perfect engraver in steel or copper. I feel sure that if the processist knew the length of the journey before him he would scarcely have desired to start on it.

But, instead of this, we found the first photogravure or the first relief photo block swaggered about and shown all over the place as a wonder, and a thing to supersede the hand entirely. Now, although the automatic methods are at present very much to the fore, yet it is chiefly as rivals. Etching has made giant strides beyond all our early anticipations; scientific skill and cultured taste have placed wood-engraving quite on the platform of a fine art. The result is that, although processing is a truculent and ever-watchful rival, it is kept in a limited field; and whether in relief or intaglio, I am quite sure that human mind and skill, having brought one branch out of nothing, will bring the other out of past shortcomings to future excellence undreamed of now.

The same spirit of swagger followed the first good results of photography, and what do we find now?—simply that it is a serviceable assistant to art; but no artist building up the feeling of a composition bit by bit, line by line, tone by tone, with centuries of work and the labor of great genius piled together on his mind, can ever get more than a suggestion from it. It is certain that the photograph is a useful help, but it is no substitute for art. So it is certain that photogravure is a useful means of producing prints—probably the best means devisable for making a high-class facsimile; yet the artist is as needful as ever, and the man of science will wait upon the artist, and the artist will help the man of science.

Thus the earlier idea of superseding and abolishing an old art must be given up, and a new idea of co-operation to a single end take its place.

I go through these points at some length because they are the result of my own laborious and energetic efforts to produce art by processing. Year after year the attack has been renewed, but though processing has advanced, it has been apparent that the goal advanced also; and that, though I could do things easily that the hand could never do so truly, yet the same hand guided by skill and taste did things that I could never catch up with by my processing.

Perhaps the prettiest point in photogravure has been its power to render the texture of the surface of the picture or original. It is peculiar that in proportion as a copy without texture is employed, such as a silver print, so in proportion does it become difficult to make a plate that pleases the eye. If, however, instead of the silver print we use the negative from which it was printed, we get a much better result—chiefly, in this case, I believe, because the print on paper is a defective

original compared with the negative, its tones being less accurate, and its outlines being a little furred up by the fibres of the paper.

But if we make a plate from a rough wash drawing, it is quite pleasing to see the rough paper texture. Now take a silver print of this rough paper sketch, and it immediately looks poor in comparison. We now see that the photogravure is capable in things where the photograph is weak, but the photograph is strong in the brilliant, yet tender, reproduction of natural forms, portraits, etc., though its very smoothness and perfectness unfits it for many purposes of art-reproduction.

This being so, it will be well to push each art along the line that it has shown a power over, and not to strain too much after things that it cannot do.

One of the beauties of photogravure is the power of giving steady, atmospheric grays. I am not sure in this graat feature it cannot break a lance with every known mode of art-reproduction. The extended grays of mezzotint are certainly not better than those of photogravure, but they are very generally worse. I can scarcely call to mind a mezzotint in which the quality of tender atmospheric grey is its one great point. Though I admit its charms of light, yet those lights are small and set up by contrast, whereas in photogravure we get mist whenever we like, as well as light.

This quality enables the impressionist photographer not only to fix in printing-ink the happy triumph of the camera, but to consult with others and add art to nature's work in the refining of one part, or the strengthening of another part, and thus it must be admitted that a new feature is added to art-reproduction in these works. It may be the summer haze over the meadows, or the driving mists of a storm on the coast; they can be caught by the practiced impressionist in photography, and they can also be fixed on paper by photogravure in a more living, moving way than by any other mode.

This, then, is one special point in the art. Let it be cultivated and encouraged. Nothing pleases men more permanently than a sweetly-rendered aspect of nature, whatever kind of aspect it is,—all are welcome in the form of pictures and prints.

There are two branches or classes of picture-reproduction in which photogravure shows considerable power. The one is a figure picture, in which clear-cut, well-drawn forms are the chief elements, the smooth surfaces of flesh and drapery lending themselves to the same power that we noticed in the case of the impressionist's landscape. The other is where powerful brush-work and flashing effects are got, in a manner that labor with a point or scraper can scarcely follow. In both these there is a field for photogravure from pictures.

But in practice I find that oil pictures are the most troublesome of subjects to work from. There is frequently a subtle irregularity in the execution or the glazing, the blue-tinted colors, rough touches of the brush afterwards painted over, and many similar things, make it slow and difficult to produce a plate. Although, therefore, one picture may be most happily and beautifully given in photogravure, it does not follow that another will, even though they look alike in effect, color, and execution. The camera is a great detective, and it often brings out things that cause much labor to set right. Another fault in a plate from a picture is the want of power to give a whole scale of tints below what it gives as a black. The artist's darkish gray generally comes black on the plate, and then we have to put in by hand several shades of darker tints. This is sometimes a risky and laborious affair.

There may be a dozen different textures and surfaces to render in various plates, and there are as many modes of putting in the color. For instance, we may use the rulette, which does not go so deep as one would wish; or a small rocker, which is better for depth. Then there is the multiple graver, or the common graver. Or a strong etching ground, and bite in a lot of etched work; or a re-bite on the old granulations. Thus, added to the trouble of doing the additional work, is the trouble of finding out the most suitable mode. When it is noticed what subtle things will make a method look wrong, it makes one nervous about putting the work in. Big rough points like the teeth of a rasp suit one place; single deep cuts with the graver suit another; and acid on a re-biting ground a third. But it requires years of practice to get the knowledge.

Therefore, photogravure should not be regarded as an independent and complete power in itself, but as a new method or means of production, having great beauties when well worked, but not able to meet every case that comes before us in the way of daily requirements.

Seeing that the nature of the original is of importance to know, it would perhaps be welcome to record the results which I have myself noted.

The best working originals are the most seldom obtained in the way of business, viz., oil-painted monochrome, with a steady solid, impasto treatment. The solid, yet not too solid, effect just suits the process, because it yields a peculiarly agreeable negative.

Perhaps the worst copy usually met with is a water-color drawing in which much sponging has been used, and where blue is prominent, or neutral tint, with perhaps a warm-looking paper. The vigorous, rough Indian-ink sketch is not intractable by any means, and this must be taken to be what I have already referred to.

A crayon drawing, if not too rough and gritty, also answers well. Some of Holbein's come out very nicely, being most delicately penciled, and having vigorous portions to bring them out.

Portraits are fairly adapted for reproduction; but it must be remembered that in them we are very captious judges—we want the minutest points in form and shade followed out, as well as a good flesh-texture. Portraits from the life are not much better adapted than portraits from painting are. The chromatic changes of the one are only more treacherous than the texture changes in the other. Perhaps the most successful results are those from old mezzotint plates, which always give a level solid negative, containing a slight grain, which is copied from the original mezzotinting.

After these there comes a sort of mixture of difficulties from many sorts of originals; perhaps the most disagreeable of all is a dear old illuminated missal or chronicle, with highly-colored little pictures. The surface of the vellum is fluffy in parts, the colors are uncontrollable, and the work entailed is great. Photographs from nature, such as are commonly executed for sale in favorite localities, also interiors of houses, garden scenes, lead pencil sketches, sepia drawing, bric-a-brac, and many similar or different things, only present new phases of difficulty. No two can be dealt with quite alike; the reason being that the eye is very critical, and the camera rather treacherous in the negative it provides for us. I refer at length to these points rather to correct the impression that whatever you ask for in photogravure, it is sure to come out prettily.

The point I would specially press, then, is this, that all the methods of photogravure yet practiced, when worked at their very best advantage, produce similar results, and the same identical difficulties meet us by whichever mode a plate is produced. One mode does, indeed, differ from another in its power as well as in its method, but the subject in which one fails will most probably fail in another method, and the good subject for one method will be a good subject for another method.

The first efforts at physical photography were said to have been the production of photogravures by the process of printing in a film of bitumen, then, after clearing it, to bite the plate in the clear parts. This mode is still practised on the Continent for line subjects, and it is a tolerable method where skill and patience with good originals and bright daylight combine, but it is practically valueless in England at the present time.

The best line method is that of G. Scamoni, of St. Petersburg, who imparted all its details to me; and though I never gave the care and labor to it that he did, I am sure that it is hard to surpass it for line-work. The method is to grow a copper-plate upon an autotype mould in line. The mould is developed on a surface covered with a fine layer of India rubber varnish, and it is made conductive by blacklead. The support may be glass, copper, or other metal, not to mention zylonite, which does very well.

This method naturally led to the desire to get half-tones. Scamoni got toned plates from crayon drawings, but not from flat tints. The mode first of all worked was by bronzing a negative or the tissue of which the mould was to be made, and this caused a multitude of punctures in the mould which, when electrotyped, became points in the copper, thus causing the portions of the mould remaining to have various depths. This method, now and again, gave very fine results, but frequently it failed. Probably if worked more in the light of modern experience it would be much better, as in those old days twelve years ago we were more anxious to get automatic conduction by means of silver and gold on the surface of the mould than it is now found necessary. It is worth while remarking that plumbago for conducting cannot be excelled, provided all proper means are taken to insure its fineness.

There were also at an early date plates called galvanoplastic. These I know not the method of. They were weak, and required a deal of line-engraver's fine ruling, etc., to put them to rights; they are, therefore, now quite out of date, and almost out of memory. But they lead one to refer to the process of Pretch, which was also practised in England for a time, and which ought to have gone on better than it did. It is worth while mentioning this process as the chief instance of depositing copper on the whole mass of gelatine. There is no mould washed away. It is caused to swell and form an automatic grain, which regulates the tint, and it should be classed with two methods which I will now detail.

The great want of my own bronze-grained plates was that you could not see defects in the plate for some reason, and therefore you could not tell where and how to work on them. I therefore hit on a mode of making a plain autotype mould on a plate, and having no grain at all. This mould or picture was then made sensitive to light again by bichromate of ammonium, and, as soon as dry, it was bronzed all over, and exposed to light for fifteen minutes. After the bronze was washed off with benzole it was put into warm water, and the new grain swelled up nicely. I worked

this method until I felt the want of true power in it, for it was too fine and velvety at all times, and, for reasons I could not regulate, the grain would vary considerably. But the idea of working from a swelled mould caused me to try moulds of plain sensitized gelatine poured very thin and level on a plate glass, and, after printing them with a toned negative, to print again with bronzed powder on the front; this added a grain just as Pretch got a grain by chemical means. I was pleased with the result, and went on with it until I found that it could not be made to produce nice flesh-tints. It had the much-longed-for property of giving a coarser grain, according as a part got darker, and that was valuable; so also small points of light stood out well, and detail of all kinds, but it was impotent in the very fine grays. The Klick process was then beginning to make a move. About this time Colonel Waterhouse invented a clever grain which we used for some time, and for a certain class of work it was excellent, but its half-tones, though powerful, were somewhat dull. The method is to take the mould as it is first washed off, and, while still wet and soft, dust it over with fine sand. The impression left by the sand is very regular and sharp, and it retains its sharpness well during electrotyping, and although it has defects of its own, yet it is a very good method and quick. Its great want is more brilliancy in the dark tones, and also a smoothness in the lightest parts, so that they fail to separate themselves from the pure whites when a number have been printed. The proper mode is to get depth enough in all parts, and then bring the lights into order by handwork. Another method is coming into practice lately to cure this feebleness in the very light parts. It is to cast over the whole plate a fresh tint by regraining it with resin or bitumen, and biting in with acid until a tone is produced. This tone may be stopped out earlier or later in some parts to save after-work, and, when all is cleared off, a proof is taken, and the lights are put into order by handwork. This procedure also improves the darks of many plates by steadying them. The new grain generally settles on the old prominences of copper, so that the effect is to deepen the old work, and not to confuse it. Moreover, the two degrees of tint, where they do come together, or one upon the other, are mutually helpful, and give the look of mystery and depth so often valuable. One depth or one layer of tone generally has a hard and prominent effect, but a double tint looks soft and suggestive. This quality was noticed by the old mezzotint engravers, who very often laid a fresh ground over a plate, which to the ordinary person looked finished; then they had all their work to scrape up again, but the plate was rich in proportion, and worth the extra trouble.

This is a proper time to describe another great want of all natural photogravure plates. It is quite absurd to suppose that what a negative has not the power to get the copper-plate made from it shall have. It is, however, very wise to gently work up a negative or transparency to effect that which nature cannot do for it.

There are various methods of doing this. If rough texture in parts is desirable, the glass may be matt varnished on the picture side, and the crayon applied on the grain. But if gentle tints are wanted, then the other side should be worked upon. It is, however, often noticeable that when the plate is produced, the hand-work is too heavy or misapplied, and it is too late to go back again. This sort of work is most called for in the dark portions of a subject, and it is best not to try too much in other parts.

When this is done, however, it is often only too plain that we have not depth enough in the plate. When an oil painting is placed against a print, it is easily seen that our scale is much shorter than the oil painting. Therefore an abundant power in reserve to give depth and power to the plate is advantageous, so that the printer need not make an opaque heavy ink to get the print right.

The printer's ink should always bear some dilution for the start of a plate, and also for the reason that it is so common that a dark, dull solidity comes from a plate having no real depth in it, yet plenty of middling dark. I have seen a plate of Goupil's (whose process I have not further gone into, beautiful though it often is) brought well out by deep etching with acid on the top of the other tint, the lines of the etching being bitten as usual through a strong ground laid on. It is difficult to really blend etching with the tint, but if contrast is called for it will do. Some form of graver is better, because you regulate its depth so instinctively to the needs of each part of the work.

The lighter portions and the use of dry-point work, together with the scraper and burnisher in finishing, are too simple to need any time being spent on their description.

Printing deserves a word. I have found that careful work with the best possible materials is most essential. A paper with a coarse fibre, however excellent otherwise, will never do for photogravures. So, too, size must not be allowed. Thus the paper admired for etchings is quite unable to print photogravures; it is harder in texture and rough, so that it cannot enter into the tiny pits in the process plate. This is unfortunate, because the presence of size greatly adds to the brilliancy of the darks in a print, and that is what we most need from the process plate. However, we have to put up with the color obtainable on an absorbent paper.

It is worth while, before concluding, to touch upon the field and opening for photogravures. It cannot be contended that every subject is best done on this plan; and as the tastes of men will from time to time demand every kind of subject, it must be evident that it will rest with us to confine our efforts to such subjects as have been proved to succeed best. In the matter of publication plates, there are so many fine etchings and such very fair autotypes obtainable that the method of photogravure wants to be particularly guarded from betrayal by some mistaken choice of a thing that will cost much labor and then turn out a failure. In plates for books, and in those folios of pictures from some locality now so frequently seen, it cannot hurt so much if there are partial failures, because they are not exposed to the public view so constantly, and also because if there is a failure there will also be several successes in the same lot.

One mode of use applicable to all kinds of printed books is to leave the space for a picture blank in the printing, and have the pictures printed on a thin India paper elsewhere, perhaps six, or eight, or ten together; these are cut up and pasted in the book at their right places. Mr. Linton's important work, "The Masters of Wood-engraving," is almost entirely photogravure, and the prints being treated as above look very natural, and fit in most easily without the least harm to the printed book itself, while it is not easy to ascertain that they are produced by an intaglio process at all. Yet the peculiar advantages of the process come out in the result, for the experts are said to wonder how it is that these reproductions are superior to the originals.

Of course, for artistic effects of great power this method is equally applicable, and it is well known that these finer effects are the very ones that most distress printers and producers of books. Yet it is on these alone that the public sets the greatest value.

I hope I have not been too long and prolix in this little essay on so modern and interesting a subject. It appeared to me far more suitable to the requirements of all that the result of my own efforts in this branch should form the chief body of the paper, rather than to go into purely technical details and questions which are all very interesting to a very few, but which experience has taught me are quite discounted by the insatiable public on the one hand and by the infinite demands of art on the other.

A. DAWSON.

A LAYMAN ON PHOTOGRAPHY AS ART.

ONE of the observations which is forced on the mind of an observer in a photographic exhibition, like the one recently held in this city, is the vast complexity and difficulty of photographic technology. Before the mysteries of focus and stops, of rapidity of plate and method of development, of toning and printing, the non-professional mind is forced into a position of modesty. But when it comes to considering the real end and aim of photography,—the question of how the finished picture impresses the beholder,—the layman certainly has a place. Technical knowledge is of course absolutely necessary for the proper appreciation of technical success or failure. The difficulties of technical processes and the value of the skill which grapples with them are important points to consider in judging of a photographic picture. But they belong to the means, and their final value is derived from the end. Any process which merely exhibits great difficulties successfully overcome has no value except as professional gymnastics. But the processes which survive are of course those whose ends are valuable, regardless of the difficulty or ease of the process. In considering work of this kind, of course, the criticisms which are purely professional are made, or should be made, as auxiliary to those which are general. In other words, art in photography comes within the province of lay criticism, just as art in general does, for art makes its appeal broadly to human nature. The extent to which technology enters into the pronouncements of art critics in general should not blind us to this fact. The consideration of the technical methods of any art partakes of the nature of a trade, and demands special technical study for its comprehension. The consideration of its broad effects, however, is not technical, but demands rather a culture of the sensibilities, and an extension and quickening of human sympathy. These attributes are not confined to any particular body, and all those who possess them,—presumably most, at least, of mankind,—are by this theory entitled to speak the thoughts which stir within them on this subject.

If the lay critic is allowed to relieve his mind whenever an art principle does enter, or is supposed to enter, into the composition of a photographic picture, he may certainly include in his criticism pretty much all of the exhibition recently held. For photography has taken unto herself the soaring ambition of the Nineteenth Century, and as the gentlemen of other callings aspire to be tonsorial artists or

artists in typography, so photographers covet a place in the category which holds Raphael and Meissonier. There is a burning desire noticeable in the work of some of them to infuse the thrill of action into their compositions, or even to make their disposition of figures and accessories convey the glow of an imaginative ideal. However we may consider this from the outside, it is evident that the capabilities of photographic processes are certain to be pushed to the verge of their actual physical competency by the enthusiasts, and leaving them alone to find the utmost extent of their reach in a direction where the bounds are certainly near, we may consider the relative value of what can be and has been done in the collection which for the time being represents the art of photography for us.

To begin with, we may find one field which photography has invaded, conquered, and made its own. The ideals of landscape photography may be poor and mean measured by the ambitions of the imaginative photographers, but then they are, we might almost venture to say, not only attainable but attained. At any rate some of the specimens shown give us a delightful feeling of rest in the contemplation of full achievement. They show masterly skill, directed with consummate judgment, toward an end within reach, and completely attained. Many partial failures, much imperfect work, we do see, but we also see that the technical processes used can be moulded by master-hands to produce work that fills its niche. And its niche we consider no low one. The human sympathies connected with the outward aspect of nature are neither so complex nor so strong as those connected with the outward aspect of man. Action does not enter, nor does visible feeling, into landscapes. But sublimity, beauty, loveliness, tranquillity, loneliness,—all these do enter; these and such as these are the prominent feelings expressed by landscapes. And they all come perfectly and easily within the range of the camera, for they affect the human soul at rest; and rest is almost the essence of the best work of the camera. There is, indeed, an imaginative landscape painting, which seeks to infuse the restless subjectivity of modern times into the objective forms of nature, and this is beyond the reach of the camera. Color, also, is yet beyond its powers, though the exquisite gradations of tone which are attainable seem hardly to leave room for a regret, so perfectly do they convey the feeling of landscape. But the selection and composition which make art of the lavish beauty of nature, and the power of combining exquisite wealth of detail with a large freedom of general effect, are within the natural and unstretched bounds of photography. It may be a distinctively Philistine utterance to say that with these powers the best landscape photography ranks with the best landscape painting. It at any rate challenges close comparison, and this is the only department where its work will bear comparison with that of the less trammeled methods of art expression.

In passing to the consideration of the more difficult and complex forms of photographic art, we may pass quickly by the sea views, which have come prominently forward with the rise and progress of instantaneous photography. They are landscapes with a difference, and they may be made to possess nearly all the virtues of the best landscapes. But there is more of motion and active life in the impression which a sea view leaves on the mind, and the camera is weaker at catching the points which suggest these than in catching those which suggest rest. But those who have seen the exquisite examples of work of this sort in the recent ex-

hibition will agree that this weakness is very slight. Excellent in composition, breadth, and spirit, they are Art, and hold their ground for photography almost as firmly as the landscapes do theirs.

Portraiture is the main-stay of photography professionally. It seems on first thought to be a branch of art which photography can compass in its length and breadth and depth. It consists simply in transferring the sitter before you to the plate and thence to the finished picture, and business push and enterprise, as well as the restless talent of the amateurs who have done so much for photography, have done their utmost to secure accuracy and competency for these processes. And it must be admitted that the attainments in this line are great. Some of the displays of portraits shown were magnificent. But it is also true that many were reprehensible, and many occupied a border country. The weakness of the art seemed to be a feeling of dissatisfaction with the sphere of portraiture pure and simple. Violent lights, strained postures, *outré* accessories were in demand;—the exaggerated and the bizarre were chosen, as if it were necessary to goad the jaded taste of the public. But excellence is never tiresome,—unless to one whose taste has been formed on museum monstrosities. The apprentice work which was shown at the exhibition, and appears in nearly all our photographers' show-cases,—the ostentatious search for mere novelty to the partial neglect of simple excellence,—is a movement which means not higher but lower art. For truly the excellent photographic portrait is an admirable thing. A picture of a head or figure posed with that exquisite feeling for the line of gravity which is such a powerful feature of the best figure work in painting, lighted intelligently, not violently, and finished perfectly, becomes an almost transparent medium for the expression of character. Here, again, photography is strong and admirable; here it exhibits assured power and complete performance; here again it comes near enough for comparison with painting. Not so near, we think, as in landscapes, for here another of the limitations of photography comes in. In ranging over the variations of expression in a face a photographer can select but he cannot combine,—or at least only to a very limited extent. Portrait painting may be and is made cumulative. The portrait painter has a chance in successive sittings to catch one after another of the characteristic sides of his subject, and if he have a fine feeling for character he shows them all in the lines of the face on his canvas. He thus makes the portrait not the portrait of the actual man at any one time, but of the potential man,—the cumulative effect of his varied moods and phases,—himself as he may be known by long acquaintance. This is character painting indeed, and it is a very deep and high art,—a divining art. Photography can only modestly admit her inability to do this, and should cling the closer to the excellence which she indubitably does possess.

Adjoining and interlacing with the domain of portraiture is that of genre photography. This, with its extensions of various degrees of pretentiousness, may be said to include all the rest of what has any claim to be called art, and in fact a great deal more. Many persons consider this the most satisfactory work open to the photographer, because entirely within the scope of his processes, and yet possessing large possibilities of real art. And this is not far from true of the more modest and self-contained work,—that which is not spoiled by any wild, outreaching ambition. But of that branch of the art which is not content to stand firmly on the solid ground,

but must needs be hoisted by its votaries into the empyrean on a rickety and ridiculous ladder,—it is not true of that. That is pre-eminently the ground for monstrosities, and plenty they are there. But before talking of these let us stop to pay a tribute to the modest, self-contained, workmanlike as well as artistic groups. These were plenty enough in the late exhibition to afford much greatly-needed instruction, and scarce enough to point our moral. Simple, homely scenes, easily posed and well grouped, with congruous accessories, and with no action or idea involved that makes the thought of the camera an absurdity, are charming, and artistically good. Much of the best of the current life of to-day comes under this head,—especially home life. There is a never-ceasing charm about the endless variations which can be played on such themes, and the exercise of such delightful art should have power to keep the wild ambitions of would-be high-art photographers from straying. But unwise attempts are of course constantly being made, and are likewise constantly striking on rocks, of which the most dangerous appear to be these,—attempts at "historical" or "imaginative" photography, and attempts at representing vivid action.

One strong reason for avoiding "historical" photography would appear to be the incongruity at the outset. The idea of the camera having been present at a time when it was very likely not invented, or at any rate where it would have not been practicable to have it, is patently ridiculous. But the more material difficulties are all-sufficient. The accessories, costumes, etc., can never be made satisfactory. The uncompromising accuracy of the camera brings out all small details of unsuitableness which a painter could smooth over into harmony with the main idea, and inevitably reveals not only a little but a great deal of the evidence of attempted untruth. Unless the faces, figures and accessories can be made exact counterparts of the originals such attempts seem useless, and of course they never can be made so. A similar difficulty occurs in an exaggerated form when an attempt is made to embody the creations of the imagination in photographic "properties."

The difficulty of photographing intense action to which we have alluded is not that of working with instantaneous plates. With these almost any action can be satisfactorily photographed if it can be caught, but of course the selection and composition which are necessary to entitle a picture to be called a work of art are rarely or never possible with this process. And when figures are posed to look as though they were in action, the falseness of it shows its cloven hoof at once. When figures are standing still they will look so, despite the greatest possible care on the part of the poser. And when they are in motion the impression they produce on the beholder is a complex one, containing much more than the idea of posture. The magic which the less trammeled painter can sometimes mix with his pigments does occasionally produce this effect, but to the best of our knowledge and belief, photography has a golden opportunity for the display of modesty when we enter this field.

The title of our article restrains us, even if space did not, from dealing with the various scientific and other applications of the instantaneous process. They are not art, and do not claim to be, and they may well glory in the fact that they do not. For, as we have seen, a large part of the glory of our best photographers consists in what they are wise enough not to attempt, and a large part of the hard falls which tyros get is due to sky-scraping,—"vaulting ambition which o'erleaps itself."

ALFRED J. FERRIS.

SOMETHING NEW IN PHOTO-LITHOGRAPHIC WORK.

Read at the Conference of the Camera Club.

THE usual method of making photo-lithographic transfers is upon gelatine made sensitive with potassium bichromate. This is quite sensitive enough to daylight, or to electric light; but if transfers are required when neither day nor electric light is available, then bichromated gelatine is useless, and some other method is wanted. Try this. Make a print upon any of the ordinary bromide papers of commerce, using a good negative from a subject in line, by artificial light; develop the image with alkaline pyro, then wash and place it upon the inking board, next blot off the water with a soft cloth, and dab all over with a sponge saturated with transfer ink, thinned with turpentine; let the turpentine evaporate, then take a glue roller, *i. e.*, a type-printer's roller, and roll until the whites are quite clear of ink. Now soak the print in the pyro again for a few seconds, and expose it to the light. Finally, wash free from pyro and hang the print up to dry. When it is dry the print is ready for the transferer, who treats it the same as he would any other photo-lithographic transfer.

The only way to fail with this method is to over- or under-expose the print, or to use a bad negative. The negative must show perfectly clear lines. Some of the newer papers of commerce contain too little gelatine to succeed perfectly; therefore, it is best to make the paper at home. It is not a very complicated process, as the color of the image under the developer is not all-important. A good formula is:

Gelatine	800 grains.
Water	30 ounces.

When the gelatine is quite soft, melt it at 120° F., and add 320 grains of ammonium bromide; stir it until it is dissolved, then add 10 minims of hydrochloric acid and stir well.

In 10 ounces of water dissolve 450 grains of nitrate of silver, bringing this solution to the same temperature as the gelatine solution; now proceed to pour the silver solution into the gelatine in a very thin stream, stirring it vigorously all the time. Now strain it into a warm dish, and tilt the solution so that it is only along one edge of the dish. Having made a small roll of the paper, lay one edge of the roll upon the liquid, and as it curls take hold of it and lift it slowly up, when the paper will unroll itself and receive a nice even coat of emulsion. Hang it up to dry and repeat until all the emulsion is used.

For half-tone transfers use the bromide and chloride of calcium with 200 grains extra of gelatine, drying the paper at as high a temperature as possible without melting the gelatine. Paper with this emulsion upon it will be very hygroscopic, and must be kept very dry. Before use always dry the paper, and warm again before developing, so as to encourage the reticulation of the gelatine.

This paper is to be exposed under a half-tone negative, developed and washed, then inked up as directed for the line transfers, followed by immersion in the developer and subsequent exposure to light, washing and drying. To transfer to stone, trim with a pair of long shears, then put it into the damping-book until quite limp; then

sponge the back of the transfer with a solution of oxalic acid 1 part, water 100 parts. Take great care that none of this solution gets on the front of the transfer. Lay the sheet in position upon a cold, dry stone and pull it through the press, with plenty of pressure, five or six times without lifting the tympan. The paper can be lifted off, leaving the image in ink on the stone. Gum it in and leave it for five or six hours before rolling up.

W. T. WILKINSON.

SILVER PRINTS ON ROUGH DRAWING PAPER.

BY J. H. BIGGS.

Some photographs I have lately printed on rough drawing paper, by a simple process which I practiced years ago, having been much admired by those who have seen them, and as I have had many inquiries concerning the *modus operandi*, I think you may consider a publication of the details will be of interest to many of the readers of the *Photographic News*; and with that view I append the following particulars:

Cut Whatman's rough drawing paper into convenient sizes, and coat each piece on one side, by floating with a warm solution of gelatine, made by dissolving sheet gelatine in the proportion of 4 grains to 1 ounce of water, and 5 grains of chloride of sodium. After drying spontaneously, the paper is ready for use at any future time.

The sensitizing is a very simple and easy process, and a sheet may be got ready for the printing frame within a quarter of an hour. Fasten the paper by pins at two corners, with the prepared side uppermost, on a board slightly smaller each way than the sheet, and place this in a sloping position. Pour a small quantity of the sensitizer into a small vessel, such as a wineglass or an egg-cup, and, with a brush well-filled with this solution, coat the paper by applying it in transverse strokes, commencing at the top, and working downward. When coated, bring the paper to a vertical position, and suspend it by one corner, attaching a fragment of dry blotting-paper to the lower corner to absorb the superfluous liquid. The drying of the paper may be expedited by holding it in front of an ordinary fire. The printing should be carried considerably beyond the strength ultimately required, as much is lost in toning and fixing.

To make the sensitizing solution, dissolve 60 grains of nitrate of silver in 1 ounce of distilled water, and add carefully drop by drop, and with shaking, strong liquor ammoniæ, until the solution, which at first becomes muddy, just clears again. If this stage is accidentally passed, add a trifle more silver.

It is obvious that a brush set in metal would be unfit for this process, but one which is thoroughly efficient and presents the advantage of being renewable for each operation is that known as a Buckle brush (from the name of its inventor), made by taking a piece of glass tube, say eight inches long and half an inch in diameter, and drawing into one end of it, either with a piece of silver wire bent to form a hook, and long enough to pass through the tube, or with a piece of string, a tuft of cotton-wool, the fibres of which have been drawn out lengthwise, the wire or string passing round the middle. When the cotton-wool is partially drawn into the tube, where it should fit tightly, it may be pulled into shape, and will be found an excellent tool for the purpose.

I have found a toning bath made with chloride of gold and bicarbonate of soda best suited for this paper, and with this, if the toning is carried far enough, and the negative is a good one, black tones rivaling platinum may be obtained.

This mode of printing is well adapted to bold and vigorous subjects, and as the paper does not curl, the pictures may be printed with deep white margins, rendering mounting unnecessary; the beauty of the photograph being, at the same time, much enhanced by the coarseness of the texture of the white paper.—*Photographic News.*

BOOK NOTICES.

NATURALISTIC PHOTOGRAPHY, by P. H. Emerson, B. A., London and New York.

The author of this book holds to the dictum, "All nature is but art, and all chance but direction," teaching emphatically that beauty is in nature alone, and that the function of art is not in idealizing or combining concepts, but in pure revelation of the actual and tangible.

If Coleridge is right when he defines imitation as the mesothesis of likeness and difference, then it seems to us that Aristotle's definition, on which the author builds, is not comprehensive enough.

Coleridge, a philosopher as well as a poet, felt there must be in all works of the imagination, whether of poetry or painting, a difference from as well as a likeness to nature, for, without the difference, poetry, however beautiful, is mere description painting, mere reflection. Shakespeare's description of the view from Dover Cliff (*King Lear*) is fine description, but not poetry. The two lines of one of his sonnets,

> "Full many a glorious morning have I seen
> *Flatter the mountain tops with sovereign eye,*"

is the highest kind of description, because it is the highest kind of poetry; yet the scene depicted, though essentially true, is not a mere reflex of nature. It reveals to us nature seen through the poet's mind, nothing disturbed, nothing changed, yet transfigured.

It seems to us that a transfiguration of the actual is essential to any great work.

The preëminence of the great masters of art, poetic or pictic, surely depends on something more than the power of selection and embodiment of particular phases of nature hid from the vulgar eye.

All pathos, all tragedy, all passion, exist in nature, as the author maintains, pure and unalloyed, but uncoined, still needing the image and superscription of the great minds to make it current.

The function of art is not in mere revelation to the physical eye, but to the mental eye, by a process of creation. Neither a mere description of natural objects nor a mere delineation of natural feelings, distinct and forcible though they be, is the ultimate aim and end of art. All art is suggestive, and the power by which a great work affects us is, in the new birth, the idea evolved from the bringing together of conceptions widely dissimilar and without apparent connection when seen isolated. The greatness is in proportion to the closeness of relation brought about by combination of the most widely dissimilar elements.

> "The poet's eye, in a fine frenzy rolling,
> Doth glance from heaven to earth, from earth to heaven,
> And, as imagination bodies forth
> The forms of things unknown, the poet's pen
> Turns them to shape, and gives to airy nothing
> A local habitation and a name."

But our object is not to discuss the limits of the imagination in art, but merely to dissent with the author of "Naturalistic Photography" for asserting so positively his peculiar views regarding the function of art.

We hardly think the position taken broad enough. One has no shock at seeing his idols demolished with one fell stroke, though the proscription involve such names as Michael Angelo, Raphael, and Turner, provided the iconoclast build up a new faith on truer principles than these great minds have established.

The practical part of Mr. Emerson's book is most admirable. We could wish the author had omitted his theoretical discussion of art to give us more of his excellent ideas on manipulation.

Mr. Emerson has produced some of the most superb work ever achieved by photography, and all who have admired his beautiful compositions are anxious to know his methods. He treats the subject in a clear and forcible way, and with much originality. Although one is not willing to subscribe to everything asserted, yet one reads and reads again with pleasure from page to page, and is often delighted with the novelty of presentation.

The great virtue in Dr. Emerson's book is its freshness. The reader is not wearied with reiteration of old hackneyed ideas and misapplication of stereotyped rules. It is a record of the author's own opinions, and though we constantly cry out our dissent from his ideas, we feel refreshed that they savor not of the paste pot and scissors.

DIE PHOTOGRAMMETRIE ODER BILDMERSKUNST, von Dr. C. Koppe, Professor an der Technische Hochschule zu Braunschweig. Weimar, 1889. Verlag des Deutschen Photographen Zeitung.

Photogrammetry, or the application of photography to the practical uses of topographical

engineering, has been making more headway in Europe than in this country, and although it can hardly be expected to give as accurate results as the more laborious methods of engineering field practice, yet for preliminary surveys and for military reconnoissances it possesses many advantages.

Dr. Koppe first gives a geometrical demonstration of the method, which practically amounts to a reversal of the methods of perspective drawing, as in this case the perspective of the photograph is to be transformed into the plane projections desired by the engineer. In practice the system involves the photographing of the ground from two stations at the extremity of a measured base line, and by having the camera mounted in a similar manner to an engineer's transit instrument, so that accurate angular measurements may be made, it is possible to obtain all the data necessary for plotting the work.

The accuracy of the work is, of course, largely dependent upon the precision of the instruments, and Dr. Koppe devotes much space to a discussion of the most suitable lenses for this purpose, and describes the Phototheodolite, a combination of a view camera and a transit instrument, very fully.

A chapter is devoted to the mathematical proof of the accuracy of the method, and an example of its practical application is given in the case of work done at the Rosstrappefelsens in the Hartz, where a sort of photographic triangulation was made from three stations.

The work is illustrated with handsome wood cuts of the apparatus, and with folding plates of the geometrical construction, and also with three Obernetterlichtdruck impressions of photographs made in the Phototheodolite.

NOTES.

I CANNOT allow this golden opportunity to pass by without breathing fervid anathemas at what I consider the most withering influence which has ever been brought to bear upon photography. You will have anticipated me when I say retouching—that insidious, treacherous photographic art. The older I get (and people tell me I am getting on), the more do I hold it in contempt. The introduction of albumenised paper, although hailed with delight by many, was, to say the least of it, a retrogressive step; but the so-called art of retouching, fraudulent and libellous as it is, has done more to degrade the art side of photography than all other abuses combined. The full power and capabilities of photography pure and simple, especially in portraiture, will never be developed until the almost despotic rule of this dangerous usurper is suppressed. Let us, then, have more genuine photography, into which the art instincts of the photographer himself have been instilled, and the means at his disposal for assisting him in his endeavours are infinitely greater now than in days of yore, and we shall find that there will no longer be the necessity for resorting to such mechanical and meretricious aids, and photography will rise with increased vitality unto more elevated regions of art. WM. COBB.

THE beautiful reproduction which graces the AMERICAN JOURNAL OF PHOTOGRAPHY for his month, is the result of the skill and artistic taste of the Photogravure Company, of New York. The negative from which the reproduction was made is an excellent one, and all the fine gradations are admirably expressed.

The Photogravure Company is well known as the publisher of that most delightful publication, entitled "Sun and Shade,"—"pictures without text,"—a monthly magazine of art, which should be possessed by every one who delights in excellent work. Not only are the pictures it gives so lavishly for the trifling subscription price the best technically, but the artistic taste and feeling in the selection of topics for representation, make the periodical an instructor in art most valuable to the student. "Sun and Shade" is evidently meeting with the popularity it so richly deserves, inasmuch as it is impossible to secure back numbers, and we are told that the publishers in several cases have been obliged to re-issue in order to meet the great demand for certain numbers.

PROF. H. A. ROWLAND exhibited, at the Photographic Exhibition in Philadelphia, his new map of the Solar Spectrum, for which he deservedly obtained a special premium.

The map extends from the extreme ultra violet end down to B. A new dividing engine to rule large gratings has been constructed, and has proved to be superior in every way to the old one, although the old one is almost equal to it for small-size gratings. It has been placed in

the vault of the new physical laboratory, where an almost constant temperature is maintained. Several concave gratings of six inches diameter and twenty-one and a half feet radius have been ruled with 10,000 or 20,000 lines to the inch, giving definition hitherto undreamed of. These have been mounted in the best possible manner.

10, Marlborough Crescent,
Bedford Park, Chiswick.
April 29th, 1889.

MY DEAR SIR:—Will you kindly find room for this little note in your Journal. I simply wish to state that my exhibit, at the recent exhibition in Philadelphia, was marked "not in competition," and therefore was not competing. It is fair to me to state this, since mention of the fact was omitted in the catalogue, and was not mentioned in the report.

Yours Respectfully,
P. H. EMERSON, B.A.
Per W. S.

THE Conference Meeting of the London Camera Club was held on Tuesday and Wednesday, March 26th and 27th. Captain Abney presided, and a number of excellent papers were presented, followed by brief discussions. We reprint some of these papers in our present issue. A fine collection of pictures was also shown.

OWING to the continued illness of Mr. Jos. J. Fox, the managing editor of *Science of Photography*, the publishers have decided to discontinue its publication.

As the March number was the last issued, they will be pleased at once to make good to subscribers, whose terms of subscription have not expired, their indebtedness to them.

ALGERNON, are you not going to photograph the eclipse of the moon to-night?

No, Maud, it would require too much time and trouble to arrange the apparatus necessary.

Why, Algernon, I thought you could take it so easily with the flash light.

WE learn from the obituary in Anthony's *Bulletin* that Mr. David Cooper died in Jamaica, W. I., on the 5th of April. Mr. Cooper was not only a man of high intelligence, but most genial and kind in disposition, and all who knew him will sincerely regret his early death.

THE Crystal Palace Photographic Fair opened in London on March 19, and continued for a month. Apparatus as well as pictures received attention.

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1—11x14 O.I.C. Copying Camera, good condition 25 00
1—5x7 Standard Victoria Camera, good as new 11 00
1—4x5 Flammang revolving back Camera, lens and tripod, new; reduced from $37 to . . . 25 00
1—17x20 American Optical Co.'s Double Swing Portrait Camera, Bonanza Holder, good as new 75 00
1—43B 8x10 Anthony's Climax Camera, with Benster Holder, good as new 25 00
1—5x8 Blair View Camera, single swing 17 00
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1—17x20 D. S. View Camera, good condition 40 00
1—8x10 American Optical Co.'s Royal Camera, double swing and carriage movement, . 25 00
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1—6½x8½ View Camera and Lens 12 00
1—6½x8½ American Optical Co. first qual. View Camera . . 23 00
1—4¼x5½ Ex. qual. Portrait Camera 17 50
1—5x8 American Optical Co. Stereo Camera 25 00
1—5x8 Scovill Camera, Lens, holder, tripod and case . . 8 00
1—5x8 Blair Compact Camera, good as new 35 00
4—5x8 Feather Weight Holders, each 75
1—8x10 American Optical Co.'s Camera, with carriage movement, fitted with 4—¼ tubes and 2 Bonanza Holders, . . . 28 00
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1—14x17 Voigtlander Portrait Lens 60 00
1—Matched pair Morrison Stereo Lenses, fitted with Hoover Shutter 35 00
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1—4x5 J. A. K. Single View Lens 2 00
1—Extra 4-4 Roettger Portrait Lens 20 00
1—2A Dallmeyer Lens 82 00
1—¼ size Harrison Lens . . . 4 00
1—Extra 4-4 Roettger Lens . . 18 00
1—11x14 Roettger Lens 22 00
1—14x17 Roettger Lens 45 00
1—8x10 Beck Lens, good as new, fitted with Prosch Shutter . 60 00
1—set ¼ Darlot Tubes 13 00
1—set ⅛ Darlot Tubes 18 00
1—4-4 Holmes, Booth & Hayden Portrait Lens 25 00
1—½ size Voigtlander Portrait Lens 10 00
1—½ size Voigtlander Lens . . 25 00
1—4x5 Dallmeyer View Lens . . 12 00
1—⅓ size L. W. Krantz Portrait Lens 12 50
1—⅓ size C. C. Harrison Portrait Lens 8 00
1—½ size Darlot quick acting Portrait Lens, central stops . 18 00
1—No. 6, 17x20 Darlot wide-angle Hemispherical Lens 35 00
1—8x10 Voigtlander Portrait Lens 80 50
1—4-4 Dallmeyer Group Lens . 50 00
1—4-4 Walzl Portrait Lens . . 20 00
1—¼ size portrait lens 3 00
1—Matched Pair Morrison wide-angle view Lenses fitted with Hoover Shutter 35 00
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June